

REMARKS

Of the pending claims, claims 1-25 and 31-35 are under consideration. Claims 1, 16, and 31 have been amended. No new matter has been added. Claims 26-30 and 36-42 were previously withdrawn from consideration.

Applicants would like to thank Examiner Angebrannt for the courtesy shown during the interview on February 8, 2007. During the interview, Applicants discussed the teachings of the cited prior art references and potential claim amendments relating to additional layers and the distribution of particles.

In the Office Action, the Examiner rejected claims 1-19 and 31-35 under 35 U.S.C. § 103(a) as unpatentable over JP 04-277558 to *Kawashima et al.* in view of JP 03-263624 to *Nakao et al.*, U.S. Patent Publication No. 2002/0054974 to *Takahashi et al.*, and U.S. Patent No. 5,689,497 to *Wilting et al.*; rejected claims 20-21 and 23-25 under 35 U.S.C. § 102(b) as anticipated by *Takahashi et al.*; rejected claims 20-25 under 35 U.S.C. § 103(a) as unpatentable over *Takahashi et al.*; rejected claims 20-22 and 24-25 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 4,735,889 to *Namba et al.*; rejected claims 20-25 under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 5,580,633 to *Kuwahara et al.*; rejected claims 20-25 U.S.C. § 103(a) as unpatentable over U.S. Patent Publication No. 2002/0001285 to *Takeshima et al.*; and rejected claims 20-25 under 35 U.S.C. § 102(b) as anticipated by JP 04-285737.

Applicants respectfully traverse the above rejections.

Rejection Under 35 U.S.C. § 103(a) over *Kawashima et al.*, *Nakao et al.*, *Takahashi et al.*, and *Wilting et al.*

The Examiner rejected claims 1-19 and 31-35 under 35 U.S.C. § 103(a) as unpatentable over *Kawashima et al.* in view of JP 03-263624 to *Nakao et al.*, *Takahashi et al.*, and U.S. Patent No. 5,689,497 to *Wilting et al.*

Claim 1 of the present application recites an optical recording medium including, *inter alia*, a transparent substrate disposed under the recording layer, the transparent substrate comprising a substrate material having a first refractive index, and a plurality of nanoparticles of a material having a second refractive index, the second refractive index being greater than the first refractive index, wherein the plurality of nanoparticles are disposed in the transparent substrate material in an amount such that the substrate converges a light to a diameter of less than 1.78 μm on the recording layer.

Claim 16 of the present application recites an optical recording medium including, *inter alia*, a plurality of nanoparticles and an anti-agglomeration coating disposed on each of the plurality of nanoparticles such that the plurality of nanoparticles can be disposed uniformly throughout the substrate.

Claim 31 recites a method of storing data including, *inter alia*, using a light source to record information through the substrate onto the recording layer, where the substrate includes a substrate material having a refractive index and a plurality of nanoparticles having a refractive index greater than that of the substrate material and being included in the substrate material at such a density that the refractive index of the substrate is greater than that of the substrate material without decreasing the transparency of the substrate.

In contrast, *Kawashima et al.* disclose adding nanoparticles of silicon oxide to a polycarbonate substrate to increase adhesion and water absorption. This reference fails to disclose or suggest adding nanoparticles of a material having a refractive index greater than that of the substrate material at a density such that the substrate converges a light to a diameter of less than 1.78 μm on the recording layer, as in claim 1 of the present application. It further fails to disclose or suggest a plurality of nanoparticles and an anti-agglomeration coating disposed on each of the plurality of nanoparticles such that the plurality of nanoparticles can be disposed uniformly throughout the substrate, as in claim 16 of the present application. *Kawashima et al.* further fails to disclose or suggest using a light source to record information through the substrate onto the recording layer, where the substrate includes a plurality of nanoparticles having a refractive index greater than that of the substrate material and being included in the substrate material at such a density that the refractive index of the substrate is greater than that of the substrate material without decreasing the transparency of the substrate.

None of the other cited references corrects those deficiencies. *Nakao et al.* disclose only particles on the surface of the substrate to avoid static electricity (see Abstract). Similarly, *Takahashi et al.* disclose only particles in a protective layer disposed over the substrate in order to increase hardness (see Abstract). *Wilting et al.* disclose adding filler particles in substrate 4, shown in Figure 2, of a flexible longitudinal tape. However, based on embodiment 4 in column 7, lines 60-66 (cited by the Examiner) and the cited European Patent Application No. 95202686.2, Applicants submit that substrate 4 is not transparent because beam 18 travels through transparent

protective layer 16. In other words, beam 18 does not pass through substrate 4. Thus, the substrate 4 or *Wilting et al.* corresponds to protective layer 140 of the present application rather than substrate 120.

Accordingly, Applicants request that the Examiner reconsider and withdraw the rejection of claims as unpatentable over *Kawashima et al.* in view of *Nakao et al.*, *Takahashi et al.*, and *Wilting et al.* Applicants submit that claims 1, 16, and 31 are in condition for allowance, as are claims 2-15, 17-19, and 32-35, at least by virtue of their dependency from allowable claims 1, 16, and 31, respectively.

Rejection Under 35 U.S.C. § 102(b) as Anticipated by *Takahashi et al.*

The Examiner rejected claims 20-21 and 23-25 under 35 U.S.C. § 102(b) as anticipated by U.S. Patent Publication No. 2002/0054974 to *Takahashi et al.*

Claim 20 recites an optical recording medium including, *inter alia*, a protective layer including a protective material having a scratch resistance and a plurality of nanoparticles of a material having a scratch resistance greater than that of the protective material and being included in the protective material at such a density that the scratch resistance of the protective layer is greater than that of the protective material. As shown in Figure 2 of the present application, the recording layer 110 is accessed by laser light through substrate 120. Protective layer 140 is disposed on the other side of the recording layer.

In contrast, *Takahashi et al.* disclose a surface-side recording medium. In the surface-side recording medium, the laser light does not pass through the substrate (see [0011]), but rather through dielectric layer 44. Layers 41 and 42 are disposed on the other side of recording layer 43 from dielectric layer 44. *Takahashi et al.* fail to disclose

a plurality of nanoparticles of a material having a scratch resistance greater than that of the protective material in layer 41 or 42.

Accordingly, Applicants request that the Examiner reconsider and withdraw the rejection of claims as anticipated by *Takahashi et al.* Applicants submit that claims 20-21 and 23-25 are in condition for allowance.

Rejection Under 35 U.S.C. § 103(a) as Unpatentable Over *Takahashi et al.*

The Examiner rejected claims 20-25 under 35 U.S.C. § 103(a) as unpatentable over *Takahashi et al.* As discussed above, *Takahashi et al.* discloses particles in layer 45 in Figure 4. It fails to disclose or suggest a plurality of nanoparticles of a material having a scratch resistance greater than that of the protective material in either layer 41 or 42.

Accordingly, Applicants request that the Examiner reconsider and withdraw the rejection of claims as unpatentable over *Takahashi et al.* Applicants submit that claims 20-25 are in condition for allowance.

Rejection Under 35 U.S.C. § 103(a) as Unpatentable Over *Namba et al.*

The Examiner rejected claims 20-22 and 24-25 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 4,735,889 to *Namba et al.* In particular, the Examiner alleges that this reference teaches “a surface coating incorporating a colloidal dispersion of silica having particles sizes of 5-8 nm.” (see Office Action page 7, paragraph 17.) Example 1, however, teaches only forming a coating from the particles (col. 33, lines 40-62). It fails, however, to disclose or suggest a protective material and a plurality of nanoparticles included in the protective material as recited by claim 20.

Accordingly, Applicants request that the Examiner reconsider and withdraw the rejection of claims as unpatentable over *Namba et al.* Applicants submit that claims 20-22 and 24-25 are in condition for allowance.

Rejection Under 35 U.S.C. § 102(b) as Anticipated by *Kuwahara et al.*

The Examiner rejected claims 21-25 under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 5,580,633 to *Kuwahara et al.* Claim 21 recites that the material that forms the nanoparticles is at least one of an oxide, a nitride, a sulfide, and a selenide. Claim 22 recites that the nanoparticles are at least one of titanium dioxide (TiO₂), magnesium oxide (MgO), yttria (YtO), zirconia (ZrO₂), silica, CeO_x, alumina (Al₂O₃), lead oxide (PbO_x), carbon nanotubes, a composite of yttria and zirconia, gallium nitride (GaN), silicon nitride, aluminum nitride, zinc selenide (ZnSe), zinc sulfide (ZnS), and an alloy comprising Zn, Se, S, Te (Tellurium).

In contrast, *Kuwahara et al.* disclose only carbon particles (col. 8, lines 20-25). This reference fails to disclose any of the nanoparticles of claims 21-22 of the present application. Moreover, claims 23-25 depend from allowable claim 20.

Accordingly, Applicants request that the Examiner reconsider and withdraw the rejection of claims as anticipated by *Kuwahara et al.* Applicants submit that claims 21-25 are in condition for allowance.

Rejection Under 35 U.S.C. § 103(a) as Obvious Over *Takeshima et al.*

The Examiner rejected claims 21-25 under 35 U.S.C. § 103(a) as unpatentable over *Takeshima et al.* As discussed above, this reference discloses a print receiving layer that includes silica particles to absorb ink (see [0025]). The protective layers adjacent to the recording layer and under the print receiving layer, however, do not

include nanoparticles. *Takeshima et al.* neither disclose nor suggest including nanoparticles to increase scratch resistance in the protective layers.

Accordingly, Applicants request that the Examiner reconsider and withdraw the rejection of claims as unpatentable over *Takeshima et al.* Applicants submit that claims 21-25 are in condition for allowance.

Rejection Under 35 U.S.C. § 102(b) as Anticipated by JP 04-285737

The Examiner rejected claims 21-25 under 35 U.S.C. § 102(e) as anticipated by JP 04-285737. Applicants note that this reference is not listed on the Examiner's PTO-892 Notice of References Cited.

As discussed above, claims 21-25 depend from claim 20. Claim 20 recites an optical recording medium including, among other things, a protective layer including a protective material having a scratch resistance and a plurality of nanoparticles of a material having a scratch resistance greater than that of the protective material and being included in the protective material at such a density that the scratch resistance of the protective layer is greater than that of the protective material (emphasis added).

In contrast, JP 04-285737 discloses alumina powder on the surface of protective layer to roughen its surface. This fails to disclose nanoparticles included in the protective material as in claim 20 of the present application.

Accordingly, Applicants request that the Examiner reconsider and withdraw the rejection of claims as anticipated by JP 04-285737. Applicants submit that claims 21-25 are in condition for allowance.

Conclusion

In view of the foregoing amendments and remarks, Applicant respectfully requests reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 50-2961.

Respectfully submitted,

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By: 

Timothy M. Hsieh
Reg. No. 42,672